CLAIMS

What is claimed is:

1. A method for identifying a mark comprising at least one recess in a substrate surface through at least one layer formed over the mark, comprising:

scanning electromagnetic radiation of at least one wavelength across at least a portion of the substrate including the at least one recess, said at least one wavelength capable of at least partially penetrating a material substantially opaque to at least some wavelengths of electromagnetic radiation;

measuring an intensity of radiation of said at least one wavelength reflected by different locations of said at least a portion of the substrate;

detecting locations at which said intensity changes from substantially a baseline intensity; and

correlating each location at which said intensity changes to identify the mark.

2. The method of claim 1, wherein said scanning comprises raster scanning said electromagnetic radiation.

3. The method of claim 1, wherein said scanning is effected over at least a portion of a wafer comprising semiconductor material where the mark is located.

4. The method of claim 1, wherein said scanning comprises scanning electromagnetic radiation comprising a plurality of wavelengths across at least said portion of the substrate.

5. The method of claim 4, wherein said measuring comprises measuring intensities of reflected radiation of each of said plurality of wavelengths.

6. The method of claim 1, wherein said scanning comprises scanning electromagnetic radiation of wavelengths of about 100 nm to about 1,000 nm across said at least a portion of the substrate.

7. The method of claim 1, wherein said scanning comprises scanning electromagnetic radiation of wavelengths of about 190 nm to about 800 nm across said at least a portion of the substrate.

8. The method of claim 1, wherein said scanning comprises scanning electromagnetic radiation of a wavelength of at least about 140 nm across said at least a portion of the substrate.

9. The method of claim 1, wherein said scanning comprises scanning electromagnetic radiation of wavelengths of about 220 nm to about 800 nm across said at least a portion of the substrate.

10. The method of claim 1, wherein said scanning comprises scanning electromagnetic radiation of wavelengths of about 300 nm to about 780 nm across said at least a portion of the substrate.

11. The method of claim 1, wherein said scanning comprises scanning electromagnetic radiation of a wavelengths of about 550 nm across at said least a portion of the substrate.

12. The method of claim 1, wherein said scanning is effected from above the substrate.

13. The method of claim 1, wherein said scanning is effected at a non-perpendicular angle relative to the substrate.

14. The method of claim 1, wherein said scanning comprises moving a source of said electromagnetic radiation relative to the substrate.

15. The method of claim 1, wherein said scanning comprises moving the substrate relative to a source of said electromagnetic radiation.

16. The method of claim 1, wherein said measuring said intensity is effected using a reflectometer.

17. The method of claim 1, wherein said detecting comprises identifying a location of the substrate from which said electromagnetic radiation was reflected.

18. The method of claim 1, wherein said detecting comprises identifying a location of the substrate to which said electromagnetic radiation was directed.

19. The method of claim 1, wherein said correlating comprises mapping at least each location at which said intensity of electromagnetic radiation reflected from said substrate varied from said baseline intensity.

20. The method of claim 19, wherein said correlating further comprises recognizing the mark based at least in part on said mapping.

21. A method for determining a destination for a semiconductor device wafer, comprising:

identifying a mark comprising at least one recess within a surface of a semiconductor device substrate and covered with at least one layer of material by:

scanning electromagnetic radiation of at least one wavelength across at least a portion of the substrate including the at least one recess, said at least one

wavelength capable of at least partially penetrating a material substantially opaque to at least some wavelengths of electromagnetic radiation;

measuring an intensity of radiation of said at least one wavelength reflected by different locations of said at least a portion of the substrate;

detecting locations at which said intensity changes from substantially a baseline intensity; and

correlating each location at which said intensity changes to identify the mark; and identifying a predetermined destination for the substrate based on the mark.

22. The method of claim 21, wherein said scanning comprises raster scanning said electromagnetic radiation.

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23. The method of claim 21, wherein said scanning is effected over at least a portion of a wafer comprising semiconductor material where the mark is located.

24. The method of claim 21, wherein said scanning comprises scanning electromagnetic radiation comprising a plurality of wavelengths across at least said portion of the substrate.

25. The method of claim 24, wherein said measuring comprises measuring intensities of reflected radiation of each of said plurality of wavelengths.

26. The method of claim 21, wherein said scanning comprises scanning electromagnetic radiation of wavelengths of about 100 nm to about 1,000 nm across said at least a portion of the substrate.

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27. The method of claim 21, wherein said scanning comprises scanning electromagnetic radiation of wavelengths of about 190 nm to about 800 nm across said at least a portion of the substrate.

28. The method of claim 21, wherein said scanning comprises scanning electromagnetic radiation of a wavelength of at least about 140 nm across said at least a portion of the substrate.

29. The method of claim 21, wherein said scanning comprises scanning electromagnetic radiation of wavelengths of about 220 nm to about 800 nm across said at least a portion of the substrate.

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30. The method of claim 21, wherein said scanning comprises scanning electromagnetic radiation of wavelengths of about 300 nm to about 780 nm across said at least a portion of the substrate.

31. The method of claim 21, wherein said scanning comprises scanning electromagnetic radiation of a wavelength of about 550 nm across said at least a portion of the substrate.

32. The method of claim 21, wherein said scanning is effected from above the substrate.

33. The method of claim 21, wherein said scanning is effected at a non-perpendicular angle relative to the substrate.

34. The method of claim 21, wherein said scanning comprises moving a source of said electromagnetic radiation relative to the substrate.

35. The method of claim 21, wherein said scanning comprises moving the substrate relative to a source of said electromagnetic radiation.

36. The method of claim 21, wherein said measuring said intensity is effected using a reflectometer.

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37. The method of claim 21, wherein said detecting comprises identifying a location of the substrate from which said electromagnetic radiation was reflected.

38. The method of claim 21, wherein said detecting comprises identifying a location of the substrate to which said electromagnetic radiation was directed.

39. The method of claim 21, wherein said correlating comprises mapping at least each location at which said intensity of electromagnetic radiation reflected from said substrate varied from said baseline intensity.

40. The method of claim 39, wherein said correlating further comprises recognizing the mark based at least in part on said mapping.

41. A system for identifying a surface feature of a substrate and at least partially covered by at least one layer of material, comprising:

at least one radiation source configured and positioned to direct electromagnetic radiation of at least one wavelength toward a substrate, said at least one wavelength capable of at least partially penetrating a material substantially opaque to at least some wavelengths of electromagnetic radiation;

at least one reflectometer positioned so as to receive electromagnetic radiation of said at least one wavelength reflected from a location of said substrate covered with a material substantially opaque to at least some wavelengths of electromagnetic radiation; and

at least one processor associated with said reflectometer for analyzing an intensity of electromagnetic radiation of said at least one wavelength reflected from said location of said substrate.

42. The system of claim 41, wherein said at least one processor includes at least one logic circuit for comparing said intensity of said at least one wavelength of radiation reflected from said location of said substrate to a baseline intensity, said logic circuit being under control of at least a portion of at least one program.

43. The system of claim 42, wherein said at least one logic circuit for comparing said intensity also effects storing in memory at least one location of said substrate where said intensity of said at least one wavelength of radiation reflected from said substrate varies from said baseline intensity.

44. The system of claim 43, wherein said at least one processor includes at least one logic circuit for mapping at least locations of said substrate where an intensity of said at least one wavelength of reflected electromagnetic radiation varies from said baseline intensity, said at least one logic circuit for mapping being under control of at least a portion of at least one program.

45. The system of claim 44, wherein said at least one processor includes at least one logic circuit for identifying said mark based on a mapped plurality of locations where an intensity of said at least one wavelength of reflected electromagnetic radiation varies from said baseline intensity, said at least one logic circuit for identifying being under control of at least a portion of at least one program.

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46. The system of claim 41, further comprising an actuation apparatus for effecting movement of at least one of said substrate and said radiation source.

47. The system of claim 41, wherein said radiation source is configured to direct incident radiation of a plurality of wavelengths onto at least a portion of said substrate.

48. The system of claim 47, wherein said reflectometer is configured to measure intensities of reflected radiation of each of said plurality of wavelengths.

49. The system of claim 41, wherein said radiation source is configured to emit incident radiation of wavelengths of about 100 nm to about 1,000 nm.

50. The system of claim 41, wherein said radiation source is configured to emit incident radiation of wavelengths of about 190 nm to about 800 nm.

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51. The system of claim 41, wherein said radiation source is configured to emit incident radiation of a wavelength of at least about 140 nm.

52. The system of claim 41, wherein said radiation source is configured to emit incident radiation of wavelengths of about 220 nm to about 800 nm.

53. The system of claim 41, wherein said radiation source is configured to emit incident radiation of wavelengths of about 300 nm to about 780 nm.

54. The system of claim 41, wherein said radiation source is configured to emit incident radiation of a wavelength of about 550 nm.

55. The system of claim 41, wherein said radiation source is positioned to emit incident radiation toward an active surface of said substrate.

56. The system of claim 41, wherein said radiation source is positioned to emit incident radiation toward an active surface of said substrate at a non-perpendicular angle thereto.

57. The system of claim 41, further comprising a user interface associated with said at least one processor.

58. The system of claim 41, further comprising at least one output device associated with said at least one processor.

59. A processor for characterizing at least one material-covered recess formed in a substrate, comprising:

at least one logic circuit for comparing a measured intensity of at least one wavelength of reflected radiation to a baseline intensity of said at least one wavelength of radiation reflected from a planar portion of said substrate; and

at least one logic circuit for mapping a plurality of locations of said substrate where said measured intensity differs from said baseline intensity, said at least one logic circuit being under control of at least a portion of at least one program.

60. The processor of claim 59, further comprising at least one logic circuit for characterizing the at least one material-covered recess based on said plurality of locations mapped by said at least one logic circuit, said at least one logic circuit for characterizing being under control of at least a portion of at least one program.